

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

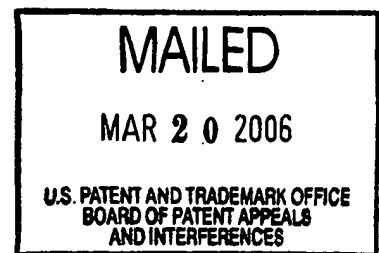
UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte Frank W. Rohlfing

Appeal No. 2005-2277
Application No. 10/099,680

ON BRIEF



Before JERRY SMITH, BARRY, and SAADAT, *Administrative Patent Judges*.
BARRY, *Administrative Patent Judge*.

A patent examiner rejected claims 1-11. The appellant appeals therefrom under 35 U.S.C. § 134(a). We reverse.

I. BACKGROUND

The invention at issue on appeal concerns electronic devices employing thin-film transistors ("TFTs"). TFTs fabricated with amorphous or polycrystalline semiconductor films may form the switching elements of a cell matrix in a flat panel display. Integrated drive circuits for such a cell matrix have also been fabricated and integrated from TFTs, often using polycrystalline silicon. Unfortunately, explains the appellant, undesirable

field-induced effects occur in the transistor characteristics of such TFTs, especially those fabricated with polycrystalline silicon formed at low temperatures. (Spec. at 1.)

A field-relief region having a lower doping concentration than the associated drain region can be used to reduce such effects in a TFT. More specifically, the TFT comprises an insulated gate adjacent to a crystalline semiconductor film for controlling a conduction channel in the film between source and drain regions. The field relief region is present between the conduction channel and drain region of the TFT. Such an architecture, however, requires two implantations. To wit, a high-dose implant is used to form the source and drain, whilst a low-dose implant is used to form the field-relief region. The appellant opines that using two implantations complicates production. (*Id.* at 2.)

In contrast, the appellant's invention employs a single implantation to fabricate source, drain, and field-relief regions in a TFT. He asserts that using a single implantation rather than two implantations simplifies manufacturing, reduces production costs, and improves throughput and yield. (*Id.*) A further understanding of the

invention can be achieved by reading the following claim.

1. A method of manufacturing an electronic device including a thin film transistor, comprising the steps of:

(a) forming a semiconductor film over an insulating substrate;

(b) depositing a first masking layer over the semiconductor film and removing portions thereof to form a plurality of holes therethrough which extend substantially perpendicularly from the upper to the lower surface thereof;

(c) patterning the first masking layer in a first pattern;

(d) depositing a second masking layer over the first masking layer;

(e) patterning the second masking layer to define a second pattern that lies within the area of the first pattern; and

(f) performing an implantation in the semiconductor film using at least the first masking layer as an implantation mask to define source and drain regions, an undoped conduction channel between the source and drain regions, and a field-relief region having a lower doping concentration than the drain region between the conduction channel and the drain region.

Claims 1-11 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S.

Patent No. 5,265,585 ("Bae").

II. OPINION

"Rather than reiterate the positions of the examiner or the appellant *in toto*, we focus on the main point of contention therebetween." *Ex parte Sehr*, No. 2003-2165, 2005 WL 191041, at *2 (Bd.Pat.App & Int. 2004). Noting that "Applicant has not claimed 'only one ion implantation,' moreover, Applicant has chosen the term 'comprising' as the transitional element of the preamble," (Examiner's Answer at 6), the examiner asserts, "Applicant's claim language as recited may include additional method steps and the Bae reference still anticipates the claim language despite the existence of an extra ion implantation step teaching." (*Id.*) The appellant argues, "From the written description of the filed application it can be appreciated that **a clear aim and benefit of the processes disclosed in the filed application** is the fabrication of the source, drain, field-relief regions, and the channel in a **single implantation**, and not the multiple implants that . . . are required by *Bae*." (Reply Br. at 7-8.)

"In addressing the point of contention, the Board conducts a two-step analysis. First, we construe the independent claim at issue to determine its scope. Second, we determine whether the construed claim is anticipated." *Ex parte Kaysen*, No. 2003-0553, 2004 WL 1697755, at *2 (Bd.Pat.App & Int. 2004).

A. CLAIM CONSTRUCTION

"Analysis begins with a key legal question — *what is the invention claimed?*" *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1567, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987). In answering the question, the indefinite article "a" generally "carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.'" *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356, 55 USPQ2d 1835, 1839 (Fed. Cir. 2000). "[T]he article 'a' receives a singular interpretation only in rare circumstances when the patentee evinces a clear intent to so limit the article." *Id.*, 55 USPQ2d at 1839. To determine whether such circumstances exist, "[t]he written description supplies additional context for understanding whether the claim language limits the patent scope to a single unitary [element] or extends to encompass a device with multiple [elements]." *Id.*, 55 USPQ2d at 1839 (quoting *Abtox, Inc. v. Exitron Corp.*, 122 F.3d 1019, 1024, 43 USPQ2d 1545, 1548 (Fed. Cir.1997)).

Here, claim 1 recites in pertinent part the following limitations: "performing an implantation in the semiconductor film using at least the first masking layer as an implantation mask to define source and drain regions, an undoped conduction channel between the source and drain regions, and a field-relief region having a lower doping concentration than the drain region between the conduction channel and the drain region." Turning to the rest of the specification, we find that the written description

discloses no more than one implantation. Opining that "[i]t is desirable to fabricate the source, drain and the field-relief region in a single implantation step in order to simplify the TFT manufacturing process, which will reduce production costs and improve throughput and yield," (Spec. at 2), the written description explains that "[i]t is an aim of the [appellant's] invention to provide an improved method of defining field relief regions in a single implantation step." (*Id.*) The written description also asserts that "[c]ombined implantation of source, drain and field-relief regions can . . . be achieved with the use of a masking layer or template for the definition of the field-relief region. . . ." (*Id.* at 3.) More specifically, it explains, "implantation of the semiconductor film 2 is carried out, with the exposed portions of the perforated insulating layer 8 constituting a first, partial mask, and the gate layer 10 acting as a second mask. This results in the definition of a source 16 and drain 18, field relief regions 20, 22, and a conduction channel 24 in the semiconductor film 2." (*id.* at 7.)

Interpreting the independent claim in view of the written description, the aforementioned limitations require using a single implantation to define *inter alia* doped source and drain regions and a field-relief region having a lower doping concentration than that of the drain region.

B. ANTICIPATION DETERMINATION

"Having construed the claim limitations at issue, we now compare the claims to the prior art to determine if the prior art anticipates those claims." *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349, 64 USPQ2d 1202, 1206 (Fed. Cir. 2002). "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (citing *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 715, 223 USPQ 1264, 1270 (Fed. Cir. 1984); *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983); *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 USPQ 781, 789 (Fed. Cir. 1983)). "[A]bsence from the reference of any claimed element negates anticipation." *Kloster Speedsteel AB v. Crucible, Inc.*, 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

Here, Bae "relates to a process for fabricating a semiconductor device having a gate-drain overlapped device (GOLD) structure, in particularly a MOS transistor thereof." Col. 1, ll. 6-9. Although the reference uses implantation to define highly doped source and drain regions and lower doped regions, the examiner admits that Bae employs "an extra ion implantation step," (Examiner's Answer at 6), to do so. For its part, the reference describes two implantations. First, as shown in Figure 3C of Bae,

an "ion-implantation brings out the forming of the low-concentration source and drain regions 56,57." Col. 4, ll. 35-36. Second, referring to Figure 3E, a "gate is used as a mask in ion-implantation of impurities with [a] high-concentration, so as to form the high-concentration source and drain regions 59,60." Col. 5, ll. 10-12.

The absence of using a single implantation to define inter alia doped source and drain regions and a field-relief region having a lower doping concentration than that of the drain region negates anticipation. Therefore, we reverse the anticipation rejection of claim 1 and of claims 2-11, which depend therefrom.

III. CONCLUSION

In summary, the rejection of claims 1-11 under § 102(e) is reversed.

Jerry Smith
JERRY SMITH


LANCE LEONARD BARRY
Administrative Patent Judge

Maximilian D. Gadow

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